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EXCITO-SECRETORY SYSTEM OF NERVES.

BY HENRY FRASER CAMPBELL, M.D.,  
MEMBER OF THE AMERICAN MEDICAL ASSOCIATION; PROFESSOR OF COMPARATIVE  
ANATOMY, &C., IN THE MEDICAL COLLEGE OF GEORGIA, ETC., ETC.

AUGUSTA :

McCAFFERTY'S OFFICE—J. MORRIS, PRINTER,

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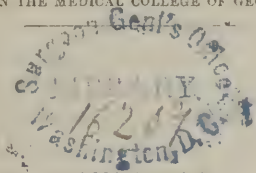
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[FOR THE LONDON LANCET.]

## LETTER.

AUGUSTA, GEORGIA, U. S. A., March 2nd, 1857.

TO MARSHALL HALL, M. D., of London, F. R. S., &c.

*My Dear Sir*—In the number of the London Lancet republished in this country, for March, 1857, (present month,) I have just read a paper from your distinguished pen; and in this paper you *announce* a system of EXCITO-SECRETORY *nerves*, in the following connection and in the following terms:

“In a memoir read at the Royal Society in February 1837, I announced the existence of an EXCITO-MOTORY system of nerves.

“I believe I may now announce a system or sub-system of EXCITO-SECRETORY Nerves, not less extensive.”

As the above announcement is here made in close relation with a discovery long admitted to be your own—viz., that of the *Excito-motory* system of nerves, and inasmuch as in your subsequent remarks, you attribute the proposition to no one else, I am left to infer that it is deemed by you an original deduction from the admitted facts of Anatomical and Physiological Science, as developed by observations and experiments during the last and the present century. Some of these last—viz., the Experiments of Mons. Claude Bernard, of Paris—you adduce with the apparent intention of fortifying the views you here express.

Finding in none of your communications upon this interesting topic, any mention made of my name or of my records, I am, with regret, impelled, from considerations of courtesy to you and of justice to myself, to call your attention to the registration of my own labors in the same important field. I will, however, first direct you particularly, though briefly, to several portions of your own communication, in order that they may be placed in convenient juxtaposition with my own records, without giving the trouble of each time referring to the pages of the Lancet:

“But the most remarkable proof of *the doctrine which I am endeavoring to unfold* is furnished by the brilliant discovery and skillful experiments of M. Cl. Bernard”—

And you here refer to his well known experiments on the Pneumogastric nerve in its relation to the secretions of the Liver, published in his Lectures on Experimental Physiology, during the winter session of 1854 and 1855.\*

In the earlier part of your communication (March, 1857) you thus announce the addition of this, as you suppose, *new* sub-system, to what you term the "Diastaltic Nervous System," the term "henceforth" apparently being used to date the initial moment of an era :

"Henceforth the Diastaltic Nervous System, must be divided into two sub-systems :

- I. The Excito-motory.
- II. The Excito-secretory.

"The former is extended to the entire muscular system ; the latter is diffused over the general system as the blood is diffused over the system."

Again, in reference to the *Pathological* Relations of the *Excito-secretory* system, you remark :

"The *Pathology* of the Excito-secretory sub-system remains to be investigated and traced. A partial keen current of air falling on *any* portion of the skin may induce inflammation in *any* susceptible internal organ. An extensive burn or scald is apt to produce pneumonia."

And as my last quotation for the present :

"But here I close this brief communication. My present object is only to draw the merest sketch of this vast subject which demands a most extensive and cautious series of experiments and observations. The efforts of many laborers, through many years, will be required fully to develop the two sub-systems of the Diastaltic nervous system.

"I propose shortly to treat this important subject at greater length and with more details."

Now, my dear sir, by a reference to the following series of records, running through a period of nearly seven years, you will at once perceive that the EXCITO-SECRETORY function of the nervous system has been the subject of earnest and diligent inquiry, and also of *plain record*, with me, for a length of time far anterior to that, at which either yourself or Mons. Bernard had published any thing on the subject.

You will herein also perceive, that this system of nerves has been plainly recognized and set forth as considered in its relations to *Pathology*, through which, indeed, its *Physiology* has been mainly deduced by me. And, lastly, that this system of nerves, before plainly stated and amply discussed, was, as early as May 5th, 1853, in the presence of the American Medical Association, the highest tribunal in the Medical Sciences within my reach,

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\* Leçon's de Physiologie, p. 325. Paris, 1855.



*publicly* NAMED *by me* the EXCITO-SECRETORY: and that too in juxta position with and contradistinction to, your own discovery, viz., the EXCITO-MOTORY function.

This name or verbal combination, then for the very first time printed in the English language, or, indeed, in *any other* language, had not, so far as I can learn, after continued and interested inquiry on my part, been printed a second time, until taken from your own recent manuscript, it appears at the heading of your paper in the March number of the London Lancet, (American edition,) and thus becomes the occasion of the present communication.

Below, I now present you with certain passages from an article on "The Influence of Dentition in producing Disease," read before the Medical Society of Augusta, Georgia, in May, 1850, and afterwards published in this city, in the Southern Medical and Surgical Journal, a periodical circulating extensively and exchanging with all the medical journals in this country and with many of those of Europe. Here you will *now* find these several records presented to you seriatim and in that order, together with the dates and accompanying circumstances, in which they were *long ago* successively presented to the Profession.

May 2nd, 1850. "Dr. Henry F. Campbell read an Essay on the Influence of Dentition in producing Disease."—[*From Minutes of a meeting of the Medical Society of Augusta, Georgia.*"]

I will not quote from or remark upon the Essay now, but fully hereafter as published below.

June, 1850. Permit me now, respected sir, to refer you to the pages of the Southern Medical and Surgical Journal, (new series,) volume 6th, number 6, June, 1850. Part I.—Original Communications. Article XV., page 321. You will in this place find the paper just cited, published—viz: "An Essay on the Influence of Dentition in producing Disease. By Henry F. Campbell, M. D., Demonstrator of Anatomy in the Medical College of Georgia."

Here you will find that I have in the beginning, sketched prominently the two orders of phenomena which occur during the period of Dentition, viz., the *convulsive* and the *secretory*, explaining the first easily enough, by a reference to the principles of Excito-motory action laid down by yourself; while the other set of phenomena I presented in such a manner as that from them, the Excito-secretory function of the nervous system became an *obvious* and an *unavoidable deduction*—by this means mutually establishing a physiological principle before scarcely ever broached or hinted at; and in the second place, leaving no chance to escape the necessary admission that this set of phenomena, before perfectly inexplicable to the Profession, could only be rationally interpreted by the admission of that very

Physiological principle. In doing this, "the two sub-systems," as you now term them, were, throughout, kept in *close relation*, but in *decided contrast*, the one being used, occasionally it is true, to illustrate the other, but never for a moment becoming *confounded* with the other—thus: "*Now let us inquire how far these phenomena are dependent upon Dentition; and ANALOGY with the EXCITO-MOTORY system will much assist us in our argument.* We have seen that local irritation can through this system, produce convulsions by the reflex function of the nerves, the sensitive branches of the fifth pair becoming excitor to the *motory spinal* nerves; and so, may we justly infer, do these same branches, under certain circumstances, become *excitor* to the SECRETORY filaments of the *sympathetic*, distributed so abundantly to the intestinal canal by a transmission of this irritation through the various ganglia with which it is connected."

You will also here see that the discussion is carried still farther into the pathological relations of the, then, new function, and that I have instanced nearly all those localities which you have recently adduced, and that I have considered those changes in the Blood while eliminating the secretions under nervous influence, which you, in your paper, designate by the word "*metharmatous*;" as in the following: "Thus the irritation at first produces simply an *exaltation* of the innervation of the secretory surfaces, and secretion is more *active* than normal, producing *simple diarrhoea*. A continuance of the irritation, *alters the character of the secretion* and we have the various morbid discharges observable during this period. This *increase and change* in the secretion are effected by the agency of the altered function of the nerve upon the arteries from which these secretions are eliminated."—(See Southern Medical and Surgical Journal, p. 331.)

Without further remark at present, I will lay before you that portion of this Essay which embodies my first record upon the Excito-secretory function of the nervous system.

"The period of Dentition has ever been regarded one of peculiar interest, as well to the pathologist as to the practitioner. That certain diseases are more apt to occur during this season, few pretend to deny; but the amount of the symptoms, due to the irritation of teething, has been variously estimated, some attributing to this cause nearly all the ills to which infancy is liable, while others ridicule the idea, that a process in itself so purely physiological and natural should be regarded *ever* a cause of disease.

"The object of our essay is to investigate impartially this important subject with the view of determining, as nearly as possible, to what extent the organism is affected by the evolution of the teeth. In doing so, it appears to us most rational, as a primary step in the investigation, to review briefly the phenomena of both normal and abnormal dentition, with the view of finding the foundation of the pathogenic theory, if such exists, in the *physiology* of this process.

"The phenomena observed during easy or normal dentition may be briefly summed up as follows;—The salivary secretion is increased, the gums are

swollen, the mouth hot, and the child evinces a disposition to press every substance within its reach upon the gums, in order to relieve the irritation it here suffers. Later, the gums become more swollen and softer, the irritation more distressing, and, under certain circumstances, the mouth dry and slightly inflamed. The child becomes fretful; its sleep is disturbed and feverish, its bowels become loose, which latter symptom we frequently observe accompanied by nausea and vomiting. There is also described by some authors an irritation of the schneiderian membrane, *with increased secretion*, marked by the child's rubbing its nose.

"Cases of anormal dentition are brought more frequently under the cognizance of physicians, and their phenomena are hence familiar to every one. The above symptoms become exaggerated—some, which in normal dentition were of trivial importance, becoming so severe as to threaten the life of the patient. Thus the gently relaxed condition of the bowels, which in easy dentition was even beneficial, is now changed to diarrhœa with distressing tormina and alarming emaciation. The salivary glands, which in easy dentition manifested their implication only by *increased secretion*, now become inflamed and swollen till finally their secretion is altogether arrested, leaving the mouth and tongue dry, parched and painful; and the nervous fretfulness of the normal process is often replaced by actual fever, sometimes attended by the most terrific convulsions.

"We have here sketched hastily some of the more prominent phenomena of both easy and severe dentition, as we each daily observe in practice, and find reported by authors, and we do not adduce them at present as the direct results or consequences of the process, but only as its pretty constant concomitants. In referring to those symptoms hereafter in the course of our essay, we will necessarily enlarge upon and develop more fully some of their characteristics. Let us now, with a little attention, enter into an analysis of these concomitants of dentition, and endeavor to ascertain whether or not their origin may be found in the process itself. To this end, we will consider briefly the *anatomy and physiology* of the parts concerned in this important and often perilous process of evolution."

\* \* \* \* \*

"From the above considerations we are induced to conclude that the *convulsions* are often produced by the irritation of dentition, and can be directly referred to this as the sole cause.

"We arrive now at a point in this somewhat obscure and much disputed question which perhaps affords more ground for doubt than any of the foregoing, viz., a consideration of the *pathogenic influence of dentition in the cholera infantum or diarrhœa* so uniformly co-existent with this process. Unlike the convulsions, the analogy between which and certain known and established phenomena of the excito-motory system, which it is only necessary to refer to, and their operation is plain and intelligible, this new set of symptoms, if we refer them to the process of dentition, requires us to look yet deeper into the mysteries of our nervous organization, and to *venture still one step further* on the *terra incerta* of sympathetic interpretation.

"In order to apply our arguments, let us hastily review the foregoing investigation, that they may bear more fully upon this part of our question; and, firstly, we have seen that inflammation, pain, and irritation are produced *locally* by the process of dentition, evinced by restlessness, biting, &c. Secondly, we have seen that this local irritation can be transmitted by



excito-motory influence to other and distant parts of the body, manifested by convulsions. We have also endeavored to corroborate this latter opinion by a reference to the order of succession in the nerves in which this irritation occurs, and also by a comparison of these phenomena with other well understood and established analogous phenomena. Heretofore we have had to deal entirely with functions of the cerebro-spinal system of nerves; but to account for this second and more obscure part of our problem, we must look in vain to any direct anatomical connection between the fifth pair and the rest of *this* system of nerves. *We are forced to seek out other connections, indeed somewhat more intricate and indirect, but fortunately no less legitimate and definable.* We have now to consider a set of organs which, unlike the voluntary muscles, have no connection, or rather, we would say, emphatically, they *have* a connection, though indirectly, with the cerebro-spinal system. We mean the abdominal viscera, which we know are almost altogether supplied from the great sympathetic system of nerves. *Now, in the prosecution of our inquiry it becomes necessary, to the elucidation of the question to trace out the same connection between the fifth pair and the sympathetic or secretory, as we did between the fifth pair and the cerebro-spinal or motory nerves,* and then, should we succeed, we will briefly inquire into the bearing which this connection and its possible results may have upon our question.

"The connections between the fifth pair, the rest of the cerebro-spinal system of nerves and the great sympathetic, are so abundant and universal that it is only necessary to enumerate a few of them to illustrate the fact. Firstly, we have a connection in the ophthalmic or first division, by its nasal branch communicating with the ciliary ganglion; then in the superior maxillary, or second division, are branches of communication with Meckel's ganglion; again, in the sub-maxillary ganglion, with the inferior maxillary or third division. So much for the fifth itself. Then we know that every one of the spinal nerves throughout the entire chord are connected to each sympathetic ganglion of the system, thus establishing communications the most abundant and intimate between these two systems of nerves. We know also that these ganglia distribute numerous branches to all the splanchnic viscera by plexuses which accompany the arterial trunks into the minute structure of these organs.

"Thus connected and distributed, this nerve presides over the important functions of nutrition and secretion, which office so characterizes it as to give it the name of the SECRETORY system. In the physiology of the nervous system, there is no fact better established by anatomy and pathology, as well as by experiments on the lower animals, than this, that the sympathetic nerve, whatever else may be its functions, always forms a necessary element in the nutrient and secretory apparatus of all the splanchnic viscera; and further, that upon its sanity depends the due administration of these two great functions. It is the nerve for the bloodvessels; "and," remark Todd and Bowman, "as secretion is mainly dependent on the normal nutrition of glands, it is reasonable to suppose that that function would be to a certain extent controlled by these nerves." And as early as the year 1732, Pourfour du Petit found that the division of the trunk of the sympathetic, opposite the fourth or fifth cervical vertebra in dogs, was followed very rapidly by great disturbance of the circulation of the eye-ball, producing inflammation, flattening of the cornea, and finally destruction of this organ.

"The experiments of Dupuy upon the horse, wherein he severed this nerve at the superior cervical ganglion, also corroborate this statement; general emaciation here ensued, with an anasarcaous condition of the limbs and an eruption over the whole cutaneous surface.

"In some experiments made by Dr. J. Reid, and reported by Todd and Bowman, in reference to the sympathetic branches supplying the eye, it was found that the effect of a section of this nerve was to produce an immediate injection of the conjunctiva. In one case, he observes, the redness of the conjunctiva took place in a few minutes after the section. It has been already stated, continue these great authors, that a section of the branches of the fifth nerve which supply the eye, is followed by ulceration and other signs of impaired nutrition in the eye-ball. But these changes do not take place for some time after the section of the nerve—generally many days elapse—and they are attributable to the presence of irritating particles which, owing to the insensible state of the conjunctiva, are suffered to remain in contact with the surface of the eye, giving rise to inflammation and ulceration of its textures. The effects of section of the sympathetic are *immediate*, and are probably due to a change produced in the blood-vessels, in consequence of the withdrawal of the accustomed nervous influence.

"We have now glanced sufficiently, we think, at the anatomy and physiology of the sympathetic system of nerves, to make the application of such points as are pertinent in the solution of our pathological problem. In its anatomy, we have seen its connections with all three of the divisions of the fifth nerve by ganglia, the connexion of these various ganglia with each other, as well as with the cerebro-spinal axis; and lastly, the distribution of branches from these ganglia, which are conducted by the arteries into every part of every one of the splanchnic viscera. In its physiology, we find it in entire charge of the important functions of nutrition and secretion, and that wherever these processes are effected, it is by the agency of this nerve alone upon the blood-vessels. And further, we have seen that pathology and experiments on lower animals establish its indispensableness to the due performance of these functions, and that whenever the supply of its innervation has been cut off from a particular part of the organism, that part immediately manifests symptoms of *impaired nutrition* and *altered secretion*.

"Now we are all aware that nearly the whole of the intestinal canal, or rather that portion between the stomach and lower part of the colon, receives no direct innervation from the cerebro-spinal axis, but is entirely dependent upon the sympathetic nerve for its supply of nervous influence of whatever kind it may enjoy, whether motory, sensory, or secretory, and consequently an impairment of the function of this nerve must necessarily correspondently alter its condition so far as regards all those functions with which this nerve endows it. The alteration in these functions would, of course, depend, in a great degree, upon the amount of impairment in the source of irritation; thus, as we have seen, if the supply is entirely cut off, the functions of the arteries seem in a great measure to cease, passive congestions occur, and the parts inflame and ulcerate. Now we can also very naturally conceive of a condition of these nerves somewhat analogous to the above, yet intermediate between the entire interruption caused by section, and perfect health—a condition of embarrassed or of exalted innervation. Now this intermediate condition is exactly the state which, from the developments of the foregoing investigation, we feel that we are authorized

to affirm, is that which occurs in severe dentition, and that upon it is dependent the whole train of intestinal morbid phenomena observable during this process.

"That this, so far, is legitimately inferable, we do not think any one will deny. Now let us enquire how far these phenomena are dependent upon dentition; and *analogously* with the *excito-motory* system will much assist us in our argument. We have seen that local irritations can, through this system, produce convulsions by the reflex function of the nerves, the *sensitive branches* of the fifth pair becoming *excitor* to the *motory* spinal nerves; and so, may we justly infer, do these *same branches*, under certain circumstances, become excitor to the *secretory* filaments of the *sympathetic*, distributed so abundantly to the intestinal canal, by transmission of this irritation through the various ganglia with which it is connected. Thus the irritation at first produces simply an exaltation of the innervation of these secretory surfaces, and consequently secretion is more active than normal, producing simple *diarrhœa*. A continuance of the irritation, alters the *character* of the secretion, and we have the various morbid discharges observable during this period. This increase and *change in the secretion* are effected by the *agency of the altered function of the nerve upon the arteries from which these secretions are eliminated*. Now, when the innervation of these arteries is still further embarrassed by the long continuance of the *reflected irritation*, the state of things nearly approaches that observed in Dupuy's, Reids's and Pourfour du Petit's experiments of actual destruction of the nerve, and we have ulceration of the intestinal mucous membrane; all these phenomena being the result of various degrees of injury sustained by the sympathetic nerve.

"It may here be asked, why should the branches supplying the intestinal mucous membrane become more implicated than any other portion of the sympathetic system?—and why do not similar irritations of the fifth nerve produce like results in the adult? To the first of these questions we answer, that most probably the other portions are implicated, but the manifestations of such implication are greater and graver here than elsewhere, because these are the sole sources of innervation to the viscus. The other organs are in all probability implicated, but receiving a certain amount of innervation from other sources, most of their functions not being entirely secretory, are still, though imperfectly, carried on. But in the intestinal canal the case is far different; the requisitions made upon it are of a nature that it has need for no other innervation than that of the sympathetic system. *Its functions are secretion and nutrition for the whole animal organism*, and when these are impaired, its primary, indeed its *only* intents are altered or completely nullified. The second question is answered by the greater development of this system in the growing than in the adult individual, for the purpose of supplying the more active nutrition and secretion at that time necessary. We know that disease is more apt to occur in many parts of the body during this period; this is the general admission. Thus, according to many authors, among whom are West, Churchill, &c., pneumonia and bronchitis are more apt to attack children during dentition, than at any previous or subsequent period. Cutaneous eruptions, and many other aberrations of secretion occurring during this period, but serve to corroborate our theory of the origin of the morbid intestinal secretion. The increased vermicular action and tormina attending this affection, find a ready explanation in the fact, now well established, that the sympathetic



receives both motor and sensitive filaments from the anterior and posterior roots of the spinal nerves, endowing the organs of their distribution, to a certain degree, with corresponding susceptibilities.

"In conclusion, let us define the position which, at the end of our investigation, we feel warranted in assuming. They are the following: that in the anatomy and physiology, as well as in the dependent analogies of the process of dentition, we find ample ground for the opinion that the diseases pertaining to this period, *may be dependent, and in many cases are entirely so, upon the local irritation attending the process being transmitted through either the cerebro-spinal system of nerves, producing convulsive diseases in the motory apparatus, or through the sympathetic, causing derangements in the secretory organs, particularly the alimentary canal, by the sway which it exercises over the arterial system, from which these secretions are eliminated.* And the practical deductions to be drawn from these conclusions are,—that we should not be remiss in taking every measure to arrest or lessen this local irritation, either by free and repeated incisions of the gums, or by the judicious administration of appropriate remedies, among which we have found opiates to prove most safe and efficient.

"It would indeed be an improving, and not an unpleasing exercise, to trace out more fully the connexions between the local irritation and the various diseases occurring during the period of dentition, to take more extended views of the abundant analogies and comparisons afforded by this truly prolific subject; but time and the special object of our essay, do not warrant the indulgence in speculations so general and discursive.

"Our object has been to trace the connexion between this process and diseases in general, only in so far as it has a bearing upon the establishment of one principal question in reference to the diarrhoea of this period. The subject has been only glanced at, and deserves a fuller and more extended treatise; wherein all the concomitant diseases of dentition, as *dropsy, eruptions*, and the many infantile neuroses, should be fully and carefully discussed. Such views, we would earnestly invite from some abler and more philosophic member of the profession."

The circumstances of my second published record are the following:—At the fifth annual meeting of the American Medical Association, (1852) held in Richmond, Virginia, not being present myself, I was appointed a special committee, to prepare an essay on the subject of TYPHOID FEVER, which essay was read before that body in New York, in May, 1853. In this paper, I took occasion to consider carefully, the ganglionic system, in the support of the position therein assumed, *that all Typhoidal Fevers were manifestations of disease through the secretory system of nerves.* While thus engaged, my attention was called to certain experiments performed by Mons. Claude Bernard, of Paris, and made public through the Gazette Médicale, and translated in the New Orleans Medical Register, together with his deductions therefrom.

On examination, finding that they contained, what at that time, appeared to me, the germ of a theory similar to mine, recorded in June, 1850, though he refers to them as "a set of phenomena *identical* with those

occurring in the cerebro-spinal system of nerves, denominated *Excito-motory* by Dr. Marshall Hall," while I had deduced this *Excito-secretory* system (in 1850,) saying "*analogy* with, the *Excito-motory* system will much assist us in our argument;" and further, inasmuch as this distinguished gentleman's report presented itself to my mind at that time, somewhat in the form of an announcement, I deemed it advisable to appeal to our National Medical Congress, in the following brief memoir, *praying permission to record before them, MY CLAIM TO PRIORITY, and also my protest against the palm of originality attaching to Mons. Claude Bernard.*

[ABSTRACT FROM THE TRANSACTIONS OF THE AMERICAN MEDICAL ASSOCIATION: MEETING HELD IN THE CITY OF NEW YORK, MAY 3RD, 1853.]

Dr. CAMPBELL, of Georgia, submitted a paper, on a question of priority in reference to the discovery of the reflex relation subsisting between the cerebro-spinal and sympathetic system of nerves.—*See Minutes of Sixth Annual Meeting*, vol. vi., page 49.

"*On the Sympathetic Nerve in Reflex Phenomena.* By HENRY F. CAMPBELL, of Georgia.

"In a recent number of the *Gazette Medicale* appear some remarks,\* by M. Cle. Bernard, on the Reflex Actions of the Nervous System. In these, he refers one order of such reflex phenomena to the sympathetic system of nerves, and illustrates, by experiments upon the frog, as well as by reference to many of the acts of nutrition and secretion, that such a relation exists between the cerebro-spinal and ganglionic system of nerves, as well as between the excitor and motory portions of the cerebro-spinal system. Or, in his own words, "two kinds of nerves are requisite for the production of these reflex phenomena of organic life: the first, transmits the impression to the nervous centres; the second, to the viscera. With one order of these nervous filaments is always connected a ganglion of the great sympathetic. Example: the lingual nerve transmits the impression of the taste to the nervous centres; a special nerve then conveys a corresponding excitation to the submaxillary gland; on one of these nerves is situated a ganglion of the sympathetic, the submaxillary ganglion," &c. He gives several illustrations of this fact, and further, appears to be of the opinion that this set of phenomena are *identical* with those occurring in the cerebro-spinal system of nerves denominated *excito-motory*, by Dr. Marshall Hall; but with this latter part of his paper we have nothing to do. It is only with that portion in which he appears to claim as his own, the suggestion of the theory that there does exist such a reflex relation between the sympathetic and the cerebro-spinal systems, and his presentation of it as an observation entirely new.

"Now, we are not aware of the exact length of time that these views have been held by physiologists; they may be old, or, on the other hand, they may be of recent suggestion; but certainly, we cannot award to M. Bernard the merit of being the first to express such views in relation to the function of the sympathetic system of nerves; and while we are exceeding-

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\* Translated by the New Orleans Medical Register.



ly reluctant to refer to our own humble labors in connection with the brilliant discoveries of this most philosophic and able observer, a sense of duty to ourself, as a member of this National Association, prompts us not to allow this assertion to pass unchallenged.

"A reference to a paper presented by us to the Medical Society of Augusta, Georgia, and published in the *Southern Medical and Surgical Journal*, on the Influence of Dentition in producing Disease, will show that this subject was fully discussed by us as early as June, 1850, and that the whole argument upon which our theory of the mode in which dentition does produce certain morbid results (diarrhœa, for instance) is based upon the supposed existence of such a reflex relation between the cerebro-spinal and ganglionic systems of nerves, as will be seen by the following: After referring the occurrence of *convulsions*, during dentition, to the reflex relations existing between certain nerves of the cerebro-spinal system, viz., the fifth pair as excitor, and the muscular branches of the spinal system as motory, we then endeavor to account for the occurrence of *diarrhœa* by establishing the existence of a similar relation between the cerebro-spinal and branches of the ganglionic system supplying the intestinal canal; which suggestions will be found embodied in the following extract from our essay in the June number of the *Southern Medical and Surgical Journal*, volume for 1850, p. 329: 'We have now glanced sufficiently, we think, at the anatomy and physiology of the sympathetic system of nerves, to make the application of such points as are pertinent, in the solution of our pathological problem. In its anatomy, we have seen its connections with all three of the divisions of the fifth nerve by ganglia, the connection of these various ganglia with each other, as well as with the cerebro-spinal axis, and lastly, the distribution of branches from these ganglia, which are conducted by the arteries into every part of every one of the splanchnic viscera. In its physiology, we find it in entire charge of the important functions of nutrition and secretion, and that wherever these processes are effected, it is by the agency of this nerve alone upon the bloodvessels. And farther, we have seen that pathology, and experiments upon the lower animals, establish its indispensableness to the due performance of these functions, and that whenever the supply of its innervation has been cut off from any particular part of the organism, that part immediately manifests symptoms of impaired nutrition and altered secretion.

"Now, we are all aware that nearly the whole of the intestinal canal, or rather that portion between the stomach and lower part of the colon, receives no direct innervation from the cerebro-spinal axis, but is entirely dependent upon the sympathetic nerve for its supply of nervous influence, of whatever kind it may enjoy, whether motory, sensory, or secretory, and consequently an impairment in the function of this nerve must, necessarily, correspondently, alter its condition, so far as regards all those functions with which this nerve endows it. The alteration in these functions would, of course, depend in a great degree upon the amount of impairment in the source of irritation; thus, as we have seen, if the supply be entirely cut off, the functions of the arteries seem in a great measure to cease, passive congestions occur, and the parts inflame and ulcerate. Now, we can also very naturally conceive of a condition of these nerves somewhat analogous to the above, yet intermediate between the entire interruption caused by section and perfect health; a condition of embarrassed, or perhaps of exalted innervation. Now, this intermediate condition is exactly the state which,

from the developments of the foregoing investigation, we feel that we are authorized to affirm is that which occurs as the result of severe dentition, and that upon it is dependent the whole train of intestinal morbid phenomena observable during this process.

“That this so far is legitimately inferable, we do not think any one will deny. Now let us inquire how far these phenomena are dependent upon dentition; and *analogy with the excito-motory system* will much assist us in our argument. We have seen that local irritations can, through this system, produce convulsions by the reflex function of the nerves, the sensitive branches of the fifth pair becoming *excitor* to the *motory* spinal nerves; and so, we may justly infer, do these same branches (of the fifth pair), under certain circumstances, become *excitor* to the *secretory filaments* of the *sympathetic*, distributed so abundantly to the *intestinal canal*, by a transmission of this irritation through the various ganglia with which it is connected. Thus, the irritation at first produces simply an exaltation of the innervation of these secretory surfaces, and consequently secretion is more active than normal, producing simple diarrhœa. A continuance of the irritation alters the character of the secretion, and we have the various morbid discharges observable during this period. This increase and change in the secretion are effected by the agency of the altered function of the nerve upon the arteries from which these secretions are eliminated. Now, when the innervation of these arteries is still farther embarrassed by the long continuance of the reflected irritation, the state of things nearly approaches what was observed in Dupuy’s, Reid’s, and Pourfour du Petit’s experiments, of actual destruction of the nerve, and we have ulceration of the intestinal mucous membrane; all these phenomena being the result of various degrees of injury sustained by the sympathetic nerve. It may here be asked, Why should the branches supplying the intestinal mucous membrane become more implicated than any other portion of the sympathetic system? And why do not similar irritations of the *fifth nerve* produce like results in the adult? To the first of these questions we answer, that most probably the other portions are implicated; but the manifestations of such implication are greater and graver here than elsewhere, because these sympathetic branches are the sole sources of innervation to the viscus. Other organs are in all probability affected; but, receiving a certain amount of innervation from other sources, most of their functions not being entirely secretory, are still, though imperfectly, carried on. But in the intestinal canal the case is far different; the requisitions made upon it are of such a nature that it has need for no other innervation than that of the sympathetic system. Its functions are secretion and nutrition for the whole animal organism; and when these are impaired, its primary, indeed its only intents are altered, or completely nullified. The second question is answered by the greater development of this system in the growing, than in the adult individual, for the purpose of supplying the more active nutrition and secretion, at that time, necessary. We know that disease is more apt to occur in many parts of the body during this period than at other times; this is the general admission. Thus, according to many authors, among whom are West, Churchill, &c., pneumonia and bronchitis are more apt to attack children during dentition than at any previous or subsequent period. Cutaneous eruptions, and many other aberrations of secretion occurring during this period, serve to corroborate our theory of the origin of the morbid intestinal secretion. The increased vermicular action and tormina attending

this affection find a ready explanation in the fact, now well established, that the sympathetic receives both motor and sensitive filaments from the anterior and posterior roots of the spinal nerves, endowing the organs of their distribution, to a certain degree, with corresponding susceptibilities.

“*In conclusion, let us define the position which, at the end of our investigation, we feel warranted in assuming. It is the following: That in the anatomy and physiology, as well as in the dependent analogies of the process of dentition, we find ample ground for the opinion that the diseases pertaining to this period may be dependent, and in many instances, are entirely so, UPON THE LOCAL IRRITATION ATTENDING THE PROCESS, BEING TRANSMITTED THROUGH the cerebro-spinal system of nerves, producing convulsive diseases in the motory apparatus, OR THROUGH THE SYMPATHETIC, CAUSING DERANGEMENTS OF THE SECRETORY ORGANS, PARTICULARLY OF THE ALIMENTARY CANAL, by the sway which it exercises over the arterial system from which these secretions are eliminated.*”

“In the above brief quotation, it will be observed that the doctrine of the reflex function between the cerebro-spinal and sympathetic systems is plainly enunciated, and not only is the physiological fact noted, but we there also have surmised the *transmission of permanent irritation*, or of paralysis from the cerebro-spinal to the sympathetic system, giving rise to various aberrations in nutrition and secretion. *This opinion we have held for several years, teaching to our classes that there existed BETWEEN THE CEREBRO-SPINAL and the GANGLIONIC system of nerves, a relation similar to that between the sensitive and motor branches of the cerebro-spinal, and which Marshall Hall terms EXCITO-MOTORY; WHILE WE HAVE TERMED THAT BETWEEN THE CEREBRO-SPINAL AND SYMPATHETIC systems EXCITO-SECRETORY.*

“As we have before indicated in this report, we do not feel authorized to lay full claim to the above theory without farther investigation of the subject; but with all due courtesy to that highly distinguished gentleman, we can say that we feel assured that these views are not original with M. Bernard, unless he entertained them previous to June, 1850. There may have been other similar observations; but until the publication of M. Bernard's, we had not noticed them elsewhere than in our paper on Dentition.”

You will perceive that in the above memoir, I have introduced enough from the first record to constitute a pretty complete *resumé* of my original announcement and process of induction. But being apprehensive that the doctrine of a *new function* so clearly and publicly defined, would suggest its appropriate NAME to some one, before I was prepared to take up the subject again, I, on this occasion, condensed into a short paragraph, as you will see, near the end of the paper, a *comprehensive RE-STATEMENT of my doctrine*, and placing it in juxta-position with your own distinguished name, and also, in contra-distinction to your own great, *analogous* discovery of the *Excito-motory* system, after *emphasizing* the word “similar,” to indicate that I did not consider them “*identical*,” I applied to it, the expressive designation (now used by yourself,) of EXCITO-SECRETORY—a word, never before that moment, (as I believe and have above stated,) written by any other person in any language, except by me, in my private notes.

As an evidence of the importance attached to this brief communication



by the publishing committee of the association, I call your attention to the fact that it is rendered conspicuous by not less than *four* references in the short index at the end of this volume of the Transactions. On the appearance of the volume, (vol. vi., 1853) several of the prominent scientific periodicals made special reference to my claim of priority preferred against Mons. Cle. Bernard, during their review of the Transactions. I send you two of these, the most prominent, perhaps, now at hand :

From American Journal of Medical Sciences, January, 1854. No. LIII, new series, p. 135. Edited by Isaac Hays, M.D., Philadelphia, Pa.

"The next article is a short paper by Dr. Henry F. Campbell, of Georgia, in which that gentleman lays claim to priority in the enunciation of the doctrine that there exists a reflex relationship between the sympathetic and the cerebro-spinal systems of nerves, which has been recently claimed by Dr. Bernard, of Paris, as an observation entirely new and original with him. Dr. Campbell has shown that, at least, priority of publication is with him."

The next is from the New York Journal of Medicine, new series, Vol. XII., No. 2, March, 1854. Edited by S. S. Purple, M.D., and Stephen Smith, M.D. Page 254.

"On the Sympathetic Nerve in Reflex Phenomena, by HENRY F. CAMPBELL, M.D., of Ga.—The design of this short article is to establish the precedence of the writer's enunciation of the doctrine of a reflex relation existing between the cerebro-spinal and ganglionic system of nerves, recently put forth by M. Bernard. The views of Dr. Campbell are contained in a paper on the Influence of Dentition in Producing Disease, published in the *Southern Medical and Surgical Journal*, in 1850. The author certainly establishes his claim to priority of publication, as far as regards Bernard's article referred to in the *Gazette Médicale*; but, if we are not mistaken, similar views have been advanced at a still earlier date. As he does not, however, pretend to priority over all others, but only so far as his information extends, we will not be to the trouble of examining the subject farther."

You will here perceive that the above claim of *Priority* over Mons. Claude Bernard, in 1854, is distinctly referred to, and recognized, by two of the leading medical periodicals of this country, both of which have exchanges in Europe, and the first especially circulating and being read, in your country, more, probably, than any other American medical journal.

On the printing of the sixth volume of the Transactions of the American Medical Association, for 1853, I engaged with the publishers to strike off extra copies, for distribution, of the "*Report on Typhoid Fever*," in which memoir, the principle of the Reflex Phenomena between the cerebro-spinal and ganglionic or secretory system of nerves is recognized, though not made a prominent feature of the essay. The pamphlet made up from these extra sheets was sent to yourself, as well as to your distinguished cotemporaries,

Drs. W. B. Carpenter, R. B. Todd, Mr. W. Bowman, and Dr. W. Jenner; and more recently, to Dr. T. B. Peacock, of St. Thomas's Hospital.

Near the close of last year, I was solicited to become senior editor of the Southern Medical and Surgical Journal, and with this subject ever uppermost in my thoughts you will observe, that my first editorial work consisted in certain strictures upon a lecture on "The Effects of Dentition, in Nursing Children," delivered at Hotel Dieu, by Mons. Trousseau, of Paris, wherein I enter into a *re-statement* of my views published in June, 1850, again bringing the *two great facts of the nervous system* into emphatic contra-distinction and analogy, the *Excito-motory* being indicated by the "*convulsive Phenomena*," while the *Excito-secretory* is instanced, by the "diarrhœa" succeeding the local irritation in the sensitive branches of the fifth pair. From this I quote the following:

"Here, it will be observed that we have unmistakable evidences of local irritation of the gums, which we know are supplied by branches of that most exquisitely sensitive of all sensitive nerves, the fifth pair; if we admit the principle of reflex action, we must recognize here a competent cause, considering the impressible character of the infant's nervous system, for the *convulsive* phenomena. On the other hand, we may trace a connection between the local irritation and the *diarrhœa* succeeding it, in an *analogous* manner, taking into view the intimate connections between the fifth pair and the nerves of the ganglionic nervous system, from which the intestinal mucous surfaces receive their *secretory* endowments.

"We have been thus careful (I here continue,) in pointing out the manner in which we think this *local irritation* may *produce* the convulsive symptoms and, also, even the *increased secretion from the mucous surface of the bowels* and the *diarrhœa*, in order to give it what we consider its proper amount of importance, and to direct attention to this, as the chief source of those difficulties, calling for early and continued care."\*

This is my latest printed record, published in this country, as you will perceive, *three months previously to your first*; but this important and extensive subject has never ceased to possess and stir my thoughts—suggested to my mind in the first instance, by an accidental and trivial circumstance, occurring years ago, in the earliest days of my pupilage, it became inwoven with the tissue of my thoughts, first, as an unpromising and tantalizing problem, it is true, but soon, as a broken seal—a revealed fact; and finally, as the familiar, *self-evident truth* of reflex nervous action.

And now, dear sir, I have completed the chain of evidence which I find in my published records upon this, to me, momentous subject. While it has been acknowledged on all hands, that there is an *unity* in the truths of *nature*, it is a pleasing reflection that there is also an *universality* in the principles of *science*—nature's humble interpreter—which makes them the property of no one clime, or particular race of men, but parts of that vast

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\* Southern Medical and Surgical Journal, Vol. XIII., pp. 20 and 21.

and common treasury, for the benefit of all mankind. To this rapidly accumulating store, your own genius and unremitting energy have contributed more, much more, than often falls to the lot of one member, of this great commonwealth, to gather. Your name must ever be associated with the history of doctrines in the physiology of the nervous system, acknowledged and made the basis of induction in every portion of the scientific world.—Observing you, admiring you, and studying you closely, can you censure me, if I have wished, in some degree, to *emulate* you, and place my humble name one day, near your own, on the scroll of science. That day is now, I hope, about to arrive; you have intimated that this *Excito-secretory* function of the nervous system, which, as I think, I have herein shown has been developed and named by me in 1850 and 1853, is a principle not less extensive than the *excito-motory* function developed and named by you in 1837. You have said, most truly, that it is “a vast subject requiring many laborers and many years, fully to develop that and the other sub-system.” I here ask permission to express the wish, that as long and as usefully as you have already lived, you may still be spared, to add much to the *fuller* development of the *Excito-secretory* system, much more than I could ever hope alone to accomplish.

Mingled with other feelings, all of which are at this moment those of sincere kindness, is the regret, that my repeated publications on this subject have never reached your eye. I feel that I am not chargeable with having omitted to give publicity to my records, as the annals of the American Medical Association will plainly reveal. As you intend publishing shortly more in detail upon these subjects, I here earnestly and respectfully ask the honor of having my records meet due acknowledgment at your distinguished hands.

And now, respected sir, I will close this already too prolonged communication: as courtesy to you, and justice to myself, were professedly the instigating causes of its inditement, I do most sincerely hope, that in the too earnest establishment of the latter, I have not at any moment even *appeared* to have forgotten the former.

I am, Sir, with feelings of great respect,

Your obedient servant,

HENRY F. CAMPBELL.



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